

# NASA TECH BRIEF



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## Multiplexer Uses Insulated Gate-Field Effect Transistors

### The problem:

To design a highly accurate and reliable multiplexer of small size and weight for telemetry applications. The multiplexer must repetitively sample up to 234 separate data lines and time-share them on a single output line to allow single-line transmission.

### The solution:

A multiplexer incorporating IG-FET's (insulated gate-field effect transistors) for all digital logic functions, including the internally generated 3.6-kHz clock. Transistors of this type are also used for analog data switching.

The multiplexer basically consists of 30 primary channels, each of which is sampled 120 times per second. Twenty-three data channels may be submultiplexed to 10 subchannels, sampled at 12 times per second. Four other data channels are sampled at only 120 times per second. The 3 remaining primary channels are used for amplitude reference and frame identification. The multiplexer accepts 0 to +5 volts and provides 2 parallel PAM (pulse amplitude modulated) wavetrain outputs, one with a 1.2-volt pedestal inserted during on time and one without pedestal. An internal calibration unit provides calibrated output levels equal to percentage values of 0, 25, 50, 75, and 100 within 0.2 percent of an externally applied voltage

reference. The multiplexer uses 15 different printed-circuit boards, making a total of 35 boards, each 2 inches x 1 inch in size. Each board is completely encapsulated in epoxy resin. The individual encapsulated boards are stacked to form a compact, rugged unit occupying a volume of 29 cubic inches and weighing 1.3 pounds.

### Notes:

1. The high accuracy and low output impedance of the multiplexer recommend it for driving either modulators or analog-to-digital converters. The system can also be used as a general purpose multiplexer in any application where time sharing or sampling is required.
2. Inquiries concerning design and performance details may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B67-10396

### Patent status:

No patent action is contemplated by NASA.

Source: S. S. Gussow  
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Category 01